CLAIMS

What is claimed is:

1. A method for shifting the phase of a pseudorandom noise (PN) code, the method comprising:

accepting a PN code with a first phase;

determining a first time interval;

selecting a phase-shifting mask in response to the first time interval;

shifting the PN code first phase with the phase-shifting mask; and

generating a PN code with a second phase, offset by the first time interval from the PN code first phase.

2. The method of claim 1 wherein determining a first time interval includes accepting a first time interval from among a plurality of first time intervals.

3. The method of claim 2 wherein selecting a phase-shifting mask in response to the first time interval includes selecting a phase-shifting mask from a plurality of phase-shifting masks.

4. The method of claim 3 further comprising:

generating the PN code at a first chip period;

accepting a second interval proportionally related to the first chip period.

5. The method of claim 4 wherein accepting a second time interval includes accepting a second time interval from among a plurality of second time intervals.

6. The method of claim 5 wherein determining a first time interval from among a plurality of first time intervals includes determining a first time interval from among a plurality of first time intervals that are offset from each other by predetermined periods of time; and

wherein selecting a phase-shifting mask from among a plurality of phase-shifting masks includes the sub-step of selecting a phase-shifting mask from among a plurality of phase-shifting masks that are offset from each other by PN code phase shifts each one corresponding to one of said first time intervals.

7. The method of claim 6 wherein generating the PN code with the first chip period includes generating a PN code with $(2^N - 1)$ states, and a period m equal to $(2^N - 1)$ times the first chip period;

wherein determining a first time interval includes selecting a first time interval in the range between zero and m, with a resolution of x; and

wherein generating a PN code with a second phase, offset a second time interval from the PN code first phase includes generating a

PN code with a second phase that is offset with respect to time in units of x.

8. The method of claim 7 wherein x is the first chip period.

9. The method of claim 7 wherein x is equal to the first chip period times q, where q is an integer.

10. The method of claim 7 wherein selecting a phase-shifting mask in response to the first time interval includes selecting a plurality of phase-shifting masks; and

wherein shifting the PN code first phase with a phase-shifting mask includes iteratively shifting the PN code first phase with each phase-shifting mask from the plurality of selected phase-shifting masks.

11. The method of claim 7 in which a direct sequence spread spectrum (DSSS) receiver with a memory is included, wherein determining a first time interval includes determining a first time interval in the range between x and nx; and

and the method further comprising:

storing n phase-shifting masks in memory, corresponding to the plurality of first time periods between x and nx; and

wherein selecting a phase-shifting mask includes selecting a phase-shifting mask from the n phase-shifting masks stored in memory.

12. The method of claim 7 in which a direct sequence spread spectrum (DSSS) receiver with a memory is included, wherein determining a first time interval includes determining a first time interval from a plurality of first time intervals in the range between x and nx; and

and the method further comprising:

storing $\log_2(n)$ phase-shifting masks in memory corresponding to $\log_2(n)$ intermediate time intervals between x and nx;

summing intermediate first time intervals to form a first time interval sum;

wherein selecting a phase-shifting mask includes selecting phase-shifting masks from memory corresponding to each of the intermediate time intervals in the first time interval sum; and

wherein shifting the PN code first phase with phase-shifting mask includes shifting the PN code first phase with the phase-shifting masks selected from memory.

13. The method of claim 7, wherein the number of masks used for storage and the number of masks required for processing being adjustable.

14. The method of claim 7 in which the DSSS receiver accepts transmissions spread using the first PN code, and in which the DSSS receiver includes a first chip rate clock;

the method further comprising:

synchronizing the accepted transmissions with the generated PN code;

following the selecting of a second time interval, powering-off the first chip rate clock during a slotted mode sleep interval;

powering-on the first chip rate clock; and

wherein determining the first time interval includes determining the sleep time interval that the first rate clock was powered-off; and

the method further comprising:

following the generating of the PN code with the second phase, resynchronizing the generated PN code with the accepted transmissions.

15. In a direct sequence spread spectrum (DSSS) communications network, a receiver comprising:

a memory having a port to supply a phase-shifting mask;

an application means to determine a first time interval, the application means cross-referencing the first time interval to the phase-shifting mask, the application means having an output connected to the memory port to request the phase-shifting mask; and

a pseudorandom noise (PN) code generator having a first input connected to the memory to accept the phase-shifting mask, the PN code generator offsetting a PN code with the phase-shifting mask, the PN code generator having an output to supply the PN code with a second phase, offset from the PN code first phase.

16. The receiver of claim 15 wherein the memory includes a plurality of phase-shifting masks; and

wherein the application means cross-references a plurality of time intervals to the plurality of phase-shifting masks in memory.

17. The receiver of claim 16 wherein the PN code generator generates the PN code at a first chip period;

wherein the application means determines a first time interval proportionally related to the first chip period; and

wherein the memory supplies a phase-shifting mask that is offset by a PN code phase shift proportionally related to the first time interval.

18. The receiver of claim 17 wherein the PN code generator generates the PN code with (2^N - 1) states, and a period m equal to (2^N - 1) times the first chip period;

wherein the application means determines a first time interval from among a plurality of time intervals in the range between zero and m, with a resolution of x; and

wherein the PN code generator generates a PN code with a second phase, offset from the PN code first phase with a phase shift, expressed as time in units of x.

19. The receiver of claim 18 wherein x is equal to the first chip period.

20. The receiver of claim 18 further comprising:

a sleep clock having an output connected to the application means with a period of q times the first chip period, where q is an integer; and

wherein the application means plurality of time intervals have a resolution of x equal to the sleep clock period.

21. The receiver of claim 18 wherein the application means includes a plurality of first time intervals in the range between x and nx; and

the memory includes n phase shift masks corresponding to the plurality of first time periods between x and nx.

22. The receiver of claim 18 wherein the application means includes a plurality of time intervals in the range between x and nx;

wherein the application means selects a plurality of $\log_2 (n)$ time intervals to form a first interval sum;

wherein the memory includes $\log_2(n)$ phase-shifting masks corresponding to $\log_2(nx)$ intermediate time intervals between x and nx; and

wherein the application means selects a plurality of phase-shifting masks from memory corresponding to a plurality of time intervals in the first time interval sum;

wherein the memory supplies the selected phase-shifting masks to the PN code generator; and

wherein the PN code generator iteratively shifts the PN code first phase with each of the plurality of selected phase-shifting masks to supply the PN code second phase.

23. The receiver of claim 18 in which transmissions are accepted spread with the PN code, and the receiver further comprising:

a first chip rate clock having an output connected to the PN code generator, the first chip rate clock being powered-off at the beginning of the first time period, and being powered-on at the finish of the first time period; and

a searcher section having an input connected to PN code generator output to accept the PN code with the second phase shift, the searcher section resynchronizing the accepted transmissions with the generated PN code, following the power-on of the first chip rate clock.

24. The receiver of claim 23 wherein the application means accepts a second time interval corresponding to a slotted sleep

mode interval, wherein the application means programs the PN code generator to be powered off for the second time interval; and

wherein the application means determines the first time interval in response the actual time that the PN code generator was powered-off.

25. In a direct sequence spread spectrum (DSSS) communications network where transmissions are spread with a PN code, a method for conserving power in a slotted mode of operation, the method comprising:

storing a plurality of phase-shifting masks;

generating a synchronized pseudorandom noise (PN) code to despread transmissions;

accepting a slotted mode sleep second time interval from a plurality of second time intervals;

beginning the sleep mode at a first phase of the PN code;

ending the sleep interval;

determining the first time interval between the beginning and the end of the sleep interval;

selecting a phase-shifting mask from storage in response to the first time interval;

offsetting the PN code first phase with the phase-shifting mask;

generating the PN code with a second phase; and

resynchronizing the generated PN code to despread transmissions.